

Work Order ID 61510

Monday, August 30, 2010 9:01:05 AM



Page 1

Item ID: D407-667-105TRN

Accept



Setup Start



Revision ID:

Item Name: Crosstube Turning Detail

Stop



Start Date: 8/30/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 9/6/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

PC

Date: 10-8-30

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

Draw Nbr

Revision Nbr

D407-667-145

Rev C

Pto

100

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8673 on both ends as per Folio FA249□2-Turn first side as per Folio FA249□3- File transition lines smooth.

Q.M. 10-09-07C

110

0.00



QC1- Inspect dimensions to dimension sheet

QC

Memo

0.00

Quality Control

Q.M. 10-09-07C

120

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA249□2- File transition lines smooth.□3- Remove sand and plugs□4-Scribe part # and batch # using vibrating stylus as per Dwg D206-667-145 □Inside of Cuff(Do not engrave on outside of tube)

Q.M. 10-09-07C

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: DL07-667.105TRJ PAR #: _____ Fault Category: X-tubes NCR: (Yes) No DQA: / Date: 10.09.15
 Resolution: Accepted ~~use AS~~ Disposition: use AS is QA: N/C Closed: _____ Date: _____

| NCR: <u>61510</u> | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|-------------------|------------|---|--|--|-------------------------------|-----------------------------|--|-----------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| <u>10.09.13</u> | <u>100</u> | <u>Tube O.D.'s ARE</u> <u>UNDER TOL, by 0.003-5"</u> <u>RL offset Tool offset</u> <u>slightly off</u> | <u>CP</u> <u>10.09.13</u> <u>QSI 042</u> | <u>Acceptable.</u> <u>REF ATTACHED SR</u> | <u>a.m</u> <u>10.09.13</u> | <u>S</u> <u>10.09.13</u> | <u>CP</u> <u>10.09.13</u> <u>QSI 042</u> | <u>S</u> <u>10.09.13</u> |
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NOTE: Date & initial all entries

Work Order ID 61510

Monday, August 30, 2010 9:01:05 AM

Page 2

Item ID: D407-667-105TRN

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Setup Start

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Stop

Item Name: Crosstube Turning Detail

Start Date: 8/30/2010 Start Qty: 1.00

Cust Item ID:

Required Date: 9/6/2010 Req'd Qty: 1.00

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

130

QC1 - Inspect dimensions to dimension sheet

0.00



QC

Memo

0.00

Quality Control

0.00 10-09-02

140

QC8- Inspect parts - second check

0.00



QC

Memo

0.00

Quality Control

8/20/13

①

150

Crosstubes Chemical Conversion

0.00



HandFXtube

Memo

0.00

Hand Finishing Crosstubes

370
10-09-13

①

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

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Page 3

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Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

160

QC3- Inspect Part Finish

0.00



QC

Memo

0.00

Quality Control

(1X) MB 10-09-14

170

Packaging

0.00



Packaging

Memo

0.00

Packaging

Identify and stock in Kanban rack Location: K-tube cul

(1X) MB 10-09-14

180

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

10/09/14
MB 10-9-14

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
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NOTE: Date & initial all entries

Picklist Print

Monday, August 30, 2010 9:01:10 AM

Page 1

Work Order ID: 61510



Parent Item: D407-667-105TRN



Parent Item Name: Crosstube Turning Detail


Start Date: 8/30/2010

Required Date: 9/6/2010

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:a 08.02.28 new issue EC
IPP Rev B 08.04.02 Removed polish EC verified by: DD

| Component Item ID/ Item Name | Replacement Item ID | Mfg/ Purch | Bin Item | Primary Location | Last Location | Route Seq ID | Unit of Measure | Qty on Hand | Qty per Kit | Total Qty | Qty Issued | Date Issued | Status |
|--|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6010-115  Crosstube Material | | Manufactured | No | | | 110 | Each | 43.0000 | 1 | 1 | | | |

Q. n 10-09-020

Location

Loc Qty

Loc Code

LG

43

26424

2

38343

41

1

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
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NOTE: Date & initial all entries

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|--|--|----------------------------------|
| DART AEROSPACE LTD | | Work Order: 61510 |
| Description: Crosstube Assembly | | Part Number: D407-667-145 |
| Inspection Dwg: D407-667-145 Rev: C | | Page 1 of 1 |

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

| | Inspection Sheet Drawing Dimension | Tolerance | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|--------|---------------------------------------|---------------|---------------------|--------|--------|-------------------------|----------|
| SIDE A | 2.240 | +0.005/-0.000 | 2.230 | ✓ | | | |
| | 1.865 | +0.005/-0.000 | 1.856 | ✓ | | | |
| | 1.878 | +0.005/-0.000 | 1.871 | ✓ | | | |
| | 1.970 | +0.005/-0.000 | 1.965 | ✓ | | | |
| | 2.030 | +0.005/-0.000 | 2.024 | ✓ | | | |
| | 2.165 | +0.005/-0.000 | 2.165 | ✓ | | | |
| | | | | | | | |
| | 0.125 | +/-0.010 | 0.125 | ✓ | | | |
| | R0.063 | +/-0.010 | R0.063 | ✓ | | | |
| | R0.500 | +/-0.010 | R0.500 | ✓ | | | |
| | R0.063 | +/-0.010 | R0.063 | ✓ | | | |
| | 4.438 | +/-0.010 | 4.438 | ✓ | | | |
| SIDE B | 2.240 | +0.005/-0.000 | 2.230 | ✓ | | | |
| | 1.865 | +0.005/-0.000 | 1.856 | ✓ | | | |
| | 1.878 | +0.005/-0.000 | 1.871 | ✓ | | | |
| | 1.970 | +0.005/-0.000 | 1.965 | ✓ | | | |
| | 2.030 | +0.005/-0.000 | 2.024 | ✓ | | | |
| | 2.165 | +0.005/-0.000 | 2.165 | ✓ | | | |
| | | | | | | | |
| | 0.125 | +/-0.010 | 0.125 | ✓ | | | |
| | R0.063 | +/-0.010 | R0.063 | ✓ | | | |
| | R0.500 | +/-0.010 | R0.500 | ✓ | | | |
| | R0.063 | +/-0.010 | R0.063 | ✓ | | | |
| | 4.438 | +/-0.010 | 4.438 | ✓ | | | |
| | 113.20 | +/-0.020 | 113.200 | ✓ | | | |

| | | | |
|---------------------------|-----------------------|----------------------------|-----|
| Measured by: A. M. | Audited by: S | Prototype Approval: | N/A |
| Date: 10.09.07 | Date: 10/09/13 | Date: | N/A |

| Rev | Date | Change | Revised by | Approved |
|-----|----------|------------------------------|------------|----------|
| A | 04.04.21 | New Issue (P/O D407-667-105) | KJ/RF | |
| B | 06.03.09 | Dwg Rev updated | KJ/JLM | |
| C | 09.06.11 | Dwg Rev updated | KJ | |

| W/O: | | WORK ORDER CHANGES | | | | | |
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

| Item | Qty -145 | Part Number | Description |
|------|-------------|-------------------|--|
| 1 | X | D407-667-145 | CROSSTUBE ASSEMBLY (407 HIGH FWD) |
| 2 | 1 | D6010-115 | CROSSTUBE |
| 3 | 2 | D2873-043 | NUT PLATE |
| 4 | 2 | D2873-045 | NUT PLATE |
| 5 | 2 | D2891-1 | SUPPORT |
| 6 | 4 | D3595-063-395 | RUBBER CUSHION |
| 7 | 4 | MS21920-20 | CLAMP (OR MS21920-21) |
| 8 | 14 | MS20601AD4W10 | RIVET (OR NAS9302B-4-10) |
| 9 | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299- 947-100, TYPE II, CLASS 2 ADHESIVE) |

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6010-115
FINISHED LENGTH = 113.20±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-145" AND BATCH NUMBER ON
INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 17.8 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY,
TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE
TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2891-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER
QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-20 CLAMPS (OR -21) WITH D3595-063-395 RUBBER CUSHIONS TO SECURE
THE D2891-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS
ARE LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN
SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 61510

BS 10-8-30

RELEASED
03/11/12

| | | | |
|------------|---|--|--------------|
| C | REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-395 WAS D2856-400-694 (ZN D6-2 & A5-2); REMOVED REF. 7 ADD TOLERANCES (ZN C6-3, C4-3, D2-3); RELOCATED FLAG #8 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4. | RF | 08.11.06 |
| B | ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKUDTUBES | PH | 05.07.26 |
| A | NEW ISSUE | CP | 02.05.08 |
| REV. | DESCRIPTION | BY | DATE |
| DESIGN | <i>9P</i> | DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA | |
| DRAWN | <i>RF</i> | DRAWING NO. | REV. C |
| CHECKED | <i>9P</i> | D407-667-145 | SHEET 1 OF 4 |
| MFG. APPR. | <i>9P</i> | TITLE | SCALE |
| APPROVED | <i>9P</i> | CROSSTUBE ASSY (407 HIGH FWD) | NTS |
| DE APPR. | <i>9P</i> | COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD. | |
| DATE | 08.11.06 | | |

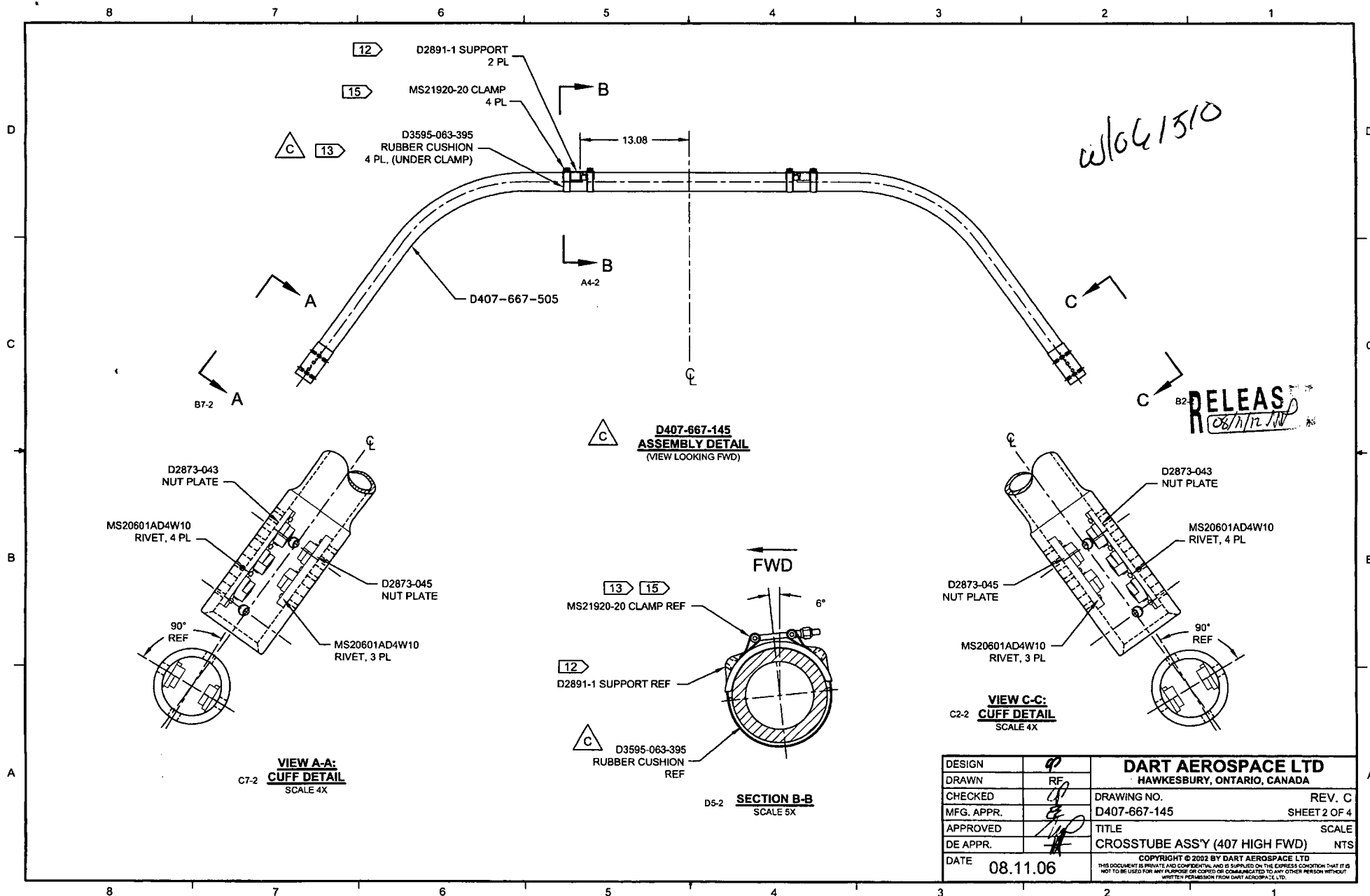
| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries



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|------------|----------|--|--------------|
| DESIGN | 92 | DART AEROSPACE LTD | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | CP | DRAWING NO. | REV. C |
| MFG. APPR. | EP | D407-667-145 | SHEET 2 OF 4 |
| APPROVED | HP | TITLE | SCALE |
| DE APPR. | HP | CROSSTUBE ASS'Y (407 HIGH FWD) | NTS |
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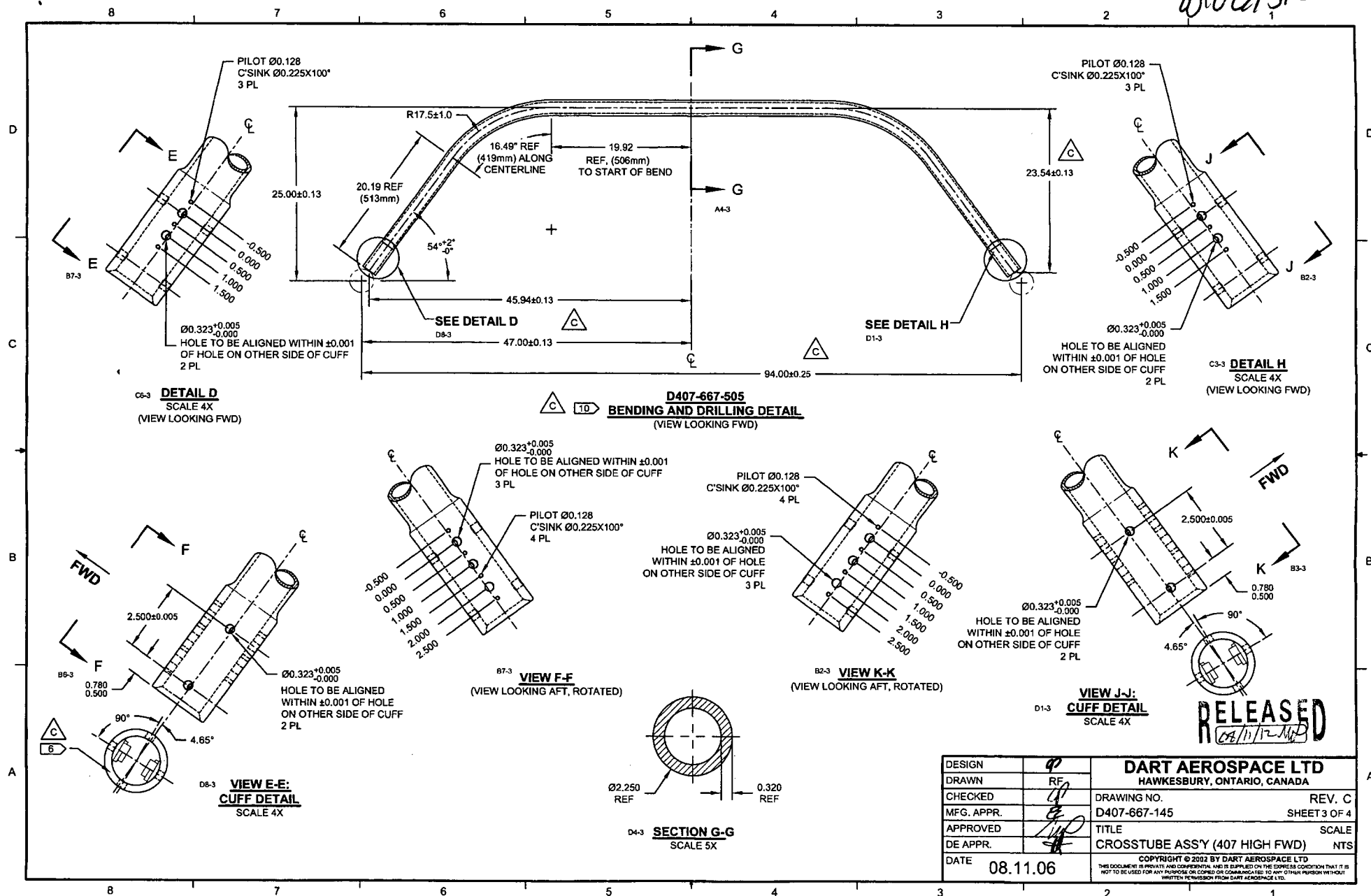
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NOTE: Date & initial all entries

WLOG1510



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|------------|----------|--|--------------|
| DESIGN | DP | DART AEROSPACE LTD | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | DP | DRAWING NO. | REV. C |
| MFG. APPR. | DP | D407-667-145 | SHEET 3 OF 4 |
| APPROVED | DP | TITLE | SCALE |
| DE APPR. | DP | CROSSTUBE ASSY (407 HIGH FWD) | NTS |
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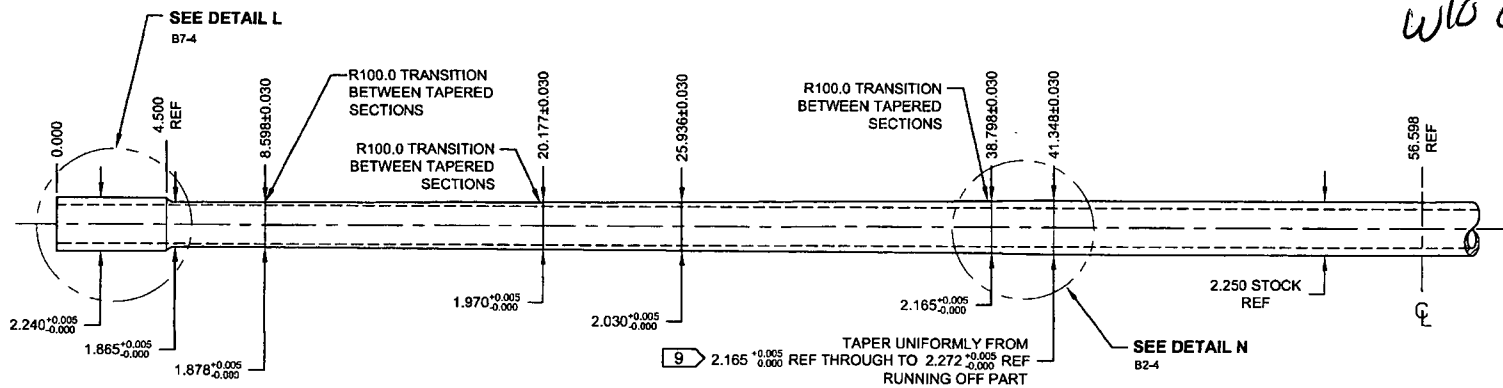
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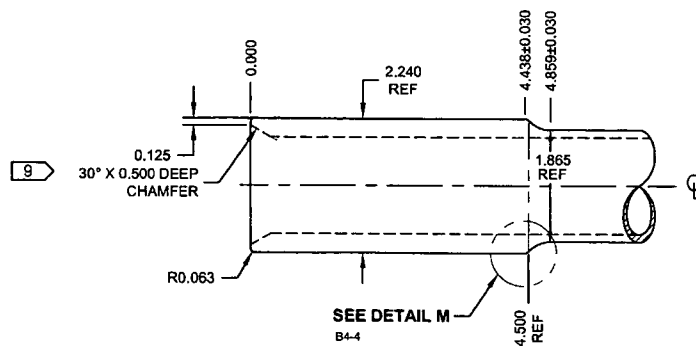
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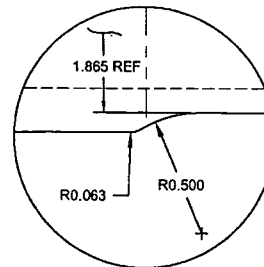
NOTE: Date & initial all entries



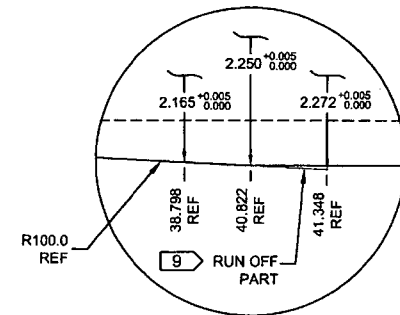
TURNING DETAIL



**DETAIL L:
CROSSTUBE CUFF**
NOT TO SCALE



**DETAIL M:
CUFF TRANSITION**
NOT TO SCALE



**DETAIL N:
TAPER RUN-OFF**
NOT TO SCALE

RELEASED
08/11/06

| | | | |
|--|----------|--|--------------|
| DESIGN | 47 | DART AEROSPACE LTD | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | 47 | DRAWING NO. | REV. C |
| MFG. APPR. | 47 | D407-667-145 | SHEET 4 OF 4 |
| APPROVED | 47 | TITLE | SCALE |
| DE APPR. | 47 | CROSSTUBE ASS'Y (407 HIGH FWD) | NTS |
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

FROM SR-D407-667-1 Rev. A
FOR D407-667-145

| SECTION | Cross tube | Damage Tolerance | O.D. (in) | I.D. (in) | Area (in ²) | Inertia (in ⁴) |
|---------|-----------------------|------------------|-----------|-----------|-------------------------|----------------------------|
| A-A | Bell fwd | 0.000 | 2.250 | 1.610 | 1.940 | 0.928 |
| | Bell fwd w/ dam. tol. | 0.005 | | | 1.935 | 0.922 |
| | Dart fwd | 0.000 | 2.250 | 1.610 | 1.940 | 0.928 |
| | Dart fwd w/ dam. tol. | 0.015 | | | 1.833 | 0.876 |
| B-B | Bell fwd | 0.000 | 2.193 | 1.610 | 1.741 | 0.806 |
| | Bell fwd w/ dam. tol. | 0.005 | | | 1.736 | 0.800 |
| | Dart fwd | 0.000 | 2.165 | 1.610 | 1.646 | 0.749 |
| | Dart fwd w/ dam. tol. | 0.015 | | | 1.538 | 0.697 |
| C-C | Bell fwd | 0.000 | 2.035 | 1.610 | 1.217 | 0.512 |
| | Bell fwd w/ dam. tol. | 0.005 | | | 1.212 | 0.507 |
| | Dart fwd | 0.000 | 2.024 | 1.610 | 1.182 | 0.494 |
| | Dart fwd w/ dam. tol. | 0.012 | | | 1.078 | 0.445 |
| D-D | Bell fwd | 0.000 | 1.975 | 1.610 | 1.028 | 0.417 |
| | Bell fwd w/ dam. tol. | 0.005 | | | 1.023 | 0.412 |
| | Dart fwd | 0.000 | 1.965 | 1.610 | 0.997 | 0.402 |
| | Dart fwd w/ dam. tol. | 0.012 | | | 0.893 | 0.354 |
| E-E | Bell fwd | 0.000 | 1.876 | 1.610 | 0.728 | 0.278 |
| | Bell fwd w/ dam. tol. | 0.005 | | | 0.723 | 0.274 |
| | Dart fwd | 0.000 | 1.870 | 1.610 | 0.711 | 0.270 |
| | Dart fwd w/ dam. tol. | 0.012 | | | 0.607 | 0.226 |
| F-F | Bell fwd | 0.000 | 1.858 | 1.610 | 0.675 | 0.255 |
| | Bell fwd w/ dam. tol. | 0.005 | | | 0.670 | 0.251 |
| | Dart fwd | 0.000 | 1.856 | 1.610 | 0.670 | 0.253 |
| | Dart fwd w/ dam. tol. | 0.012 | | | 0.566 | 0.209 |
| G-G | Bell fwd | 0.000 | 2.250 | 1.610 | 1.940 | 0.928 |
| | Bell fwd w/ dam. tol. | 0.005 | | | 1.935 | 0.922 |
| | Dart fwd | 0.000 | 2.230 | 1.610 | 1.870 | 0.884 |
| | Dart fwd w/ dam. tol. | 0.030 | | | 1.748 | 0.813 |

| SECTION | Cross tube | Bending Ultimate (lb*in) | Bending Yield (lb*in) | Tension Ultimate (lb) | Tension Yield (lb) | Shear Ultimate (lb) |
|---------|------------------|--------------------------|-----------------------|-----------------------|--------------------|---------------------|
| A-A | Bell fwd w/ DT | 54085 | 45891 | 127726 | 108374 | 81280 |
| | Dart fwd w/ DT | 59941 | 51723 | 141158 | 120992 | 75162 |
| | Margin of Safety | 0.11 | 0.13 | 0.11 | 0.12 | -0.08 |
| B-B | Bell fwd w/ DT | 48124 | 40832 | 114599 | 97235 | 72926 |
| | Dart fwd w/ DT | 49601 | 42812 | 118463 | 101539 | 63077 |
| | Margin of Safety | 0.03 | 0.05 | 0.03 | 0.04 | -0.14 |
| C-C | Bell fwd w/ DT | 32876 | 27895 | 79971 | 67854 | 50891 |
| | Dart fwd w/ DT | 33848 | 29229 | 82974 | 71120 | 44181 |
| | Margin of Safety | 0.03 | 0.05 | 0.04 | 0.05 | -0.13 |
| D-D | Bell fwd w/ DT | 27547 | 23373 | 67499 | 57272 | 42954 |
| | Dart fwd w/ DT | 27728 | 23950 | 68741 | 58921 | 36602 |
| | Margin of Safety | 0.01 | 0.02 | 0.02 | 0.03 | -0.15 |
| E-E | Bell fwd w/ DT | 19264 | 16345 | 47737 | 40504 | 30378 |
| | Dart fwd w/ DT | 18628 | 16070 | 46708 | 40035 | 24870 |
| | Margin of Safety | -0.03 | -0.02 | -0.02 | -0.01 | -0.18 |
| F-F | Bell fwd w/ DT | 17822 | 15122 | 44253 | 37548 | 28161 |
| | Dart fwd w/ DT | 17307 | 14931 | 43553 | 37331 | 23191 |
| | Margin of Safety | -0.03 | -0.01 | -0.02 | -0.01 | -0.18 |
| G-G | Bell fwd w/ DT | 54085 | 45891 | 127726 | 108374 | 81280 |
| | Dart fwd w/ DT | 56148 | 48783 | 134584 | 115358 | 71662 |
| | Margin of Safety | 0.04 | 0.06 | 0.05 | 0.06 | -0.12 |

SECTION E-E $F = \frac{M_c}{I} = \frac{P \times 6.11 \times 0.935}{0.226} = P \times 25.28$

SUPPORT $F = \frac{M_c}{I} = \frac{P \times 33.92 \times 1.125}{0.876} = P \times 43.56$

SECTION F-F $F = \frac{M_c}{I} = \frac{P \times 3.70 \times 0.928}{0.209} = P \times 16.605$

WILL FAIL IN BENDING FIRST

MARGIN IS NEGATIVE FOR E-E & F-F, HOWEVER TUBE WILL FAIL IN BENDING @ SUPPORT LONG BEFORE SECTION E-E OR F-F REACH YIELD POINT. ∴ SECTION E-E & F-F ARE ACCEPTABLE.

CP 10.09.13

